

REMARKS

Claims 1-15, 17-25, and 28 are pending in the application. Claim 11 has been cancelled by this amendment. Therefore, claims 1-10, 12-15, 17-25 and 28 are at issue.

Claims 1 and 28 have been amended to recite that the plasticizing component is present essentially in its unreacted form. Support for these amendments can be found in the specification at page 6, lines 18-22; page 21, lines 8-16; page 22, lines 12-36; and page 23, lines 13-15.

Claims 1-11, 13-15, 18-20, 23, 25, and 28 stand rejected under 35 U.S.C. §103 as being unpatentable over Wang et al. U.S. Patent No. 6,011,196 ('196) in view of Beihoffer et al. U.S. Patent No. 6,021,101 ('101). The examiner contends that because the '196 patent discloses an absorbent sheet consisting essentially of a superabsorbent polymer (SAP) component and a plasticizing component, and because the '101 patent discloses multicomponent SAPs, it therefore would have been obvious to substitute a multicomponent SAP of the '101 patent for the SAP of the '196 patent in the preparation of a flexible absorbent sheet. Applicants traverse this rejection.

To establish a *prima facie* case of obviousness, the examiner must satisfy three requirements. First, as the U.S. Supreme Court recently held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of

success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. In *re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

Although the examiner states that the '196 patent is directed to an absorbent sheet, the '196 patent actually is directed to an absorbent material in *particulate* form, which is the *reaction* product of a hydrogel-forming polymer and a polycationic polymer, wherein the reaction forms a covalent bond between the two polymers ('196 patent, abstract and column 3, lines 27-37).

As stated above, the '196 patent is directed to discrete particles (column 8, lines 8-19). This is in contrast to the present claims that are directed to a self-supporting, coherent, roll-good sheet, as opposed to an absorbent core in a diaper containing discrete SAP particles. Contrary to the individual particles of the '196 patent, the present claims recite a flexible *sheet* material consisting essentially of SAP component and a plasticizer component, wherein these two components account for about 60% to 100%, by weight of the sheet (claim 1). Claim 28 specifically recites a *fluffless* absorbent sheet.

In accordance with the explicit teachings of the '196 patent, the polycationic polymer reacts with the absorbent particles to a substantial, if not complete, degree. In particular at least 80%, and preferably at least 90%, of the polycationic polymer is covalently bonded to the absorbent polymer ('196 patent, column 4, line 28 to column 5, line 6). This covalent bonding leads to the superior liquid permeability achieved by the absorbent material of the '196 patent (column 4, lines 48-52).

In direct contrast to the '196 patent, the present claims recite a plasticizing component that is present in its essentially unreacted form. It is this unreacted form of the plasticizing component that provides the coherent, flexible sheet of the present invention. For example, as stated in the present specification:

"The heat and pressure or the pressure alone, and time of treatment, is sufficiently mild such that essentially no surface crosslinking reaction occurs between the functional groups of

the acidic and basic resin and any functional group present on the plasticizer, i.e., the plasticizer is not consumed in the thermal pressing step. (page 6, lines 18-22);

"The plasticizer component reduces stiffness, brittleness, and/or rigidity of the sheet, and allows deformation of the absorbent sheet material without substantial cracking, tearing, splitting, breaking, or otherwise fracturing of the sheet material. In addition, the reduction in stiffness, brittleness, and/or rigidity is permanent." (page 17, lines 3-6);

"As used herein, the term "essentially no surface crosslinking reaction" is defined to mean that at least 90% of the plasticizer component is present in an absorbent sheet, after thermal pressing, in its free, or unreacted, form, as opposed to a reacted residue form, e.g., as in a surface crosslinked form." (page 21, lines 13-16); and

"Under the thermal pressing conditions disclosed above, the plasticizer component does not substantially react with functional groups of the SAP component. Accordingly, the thermal pressing step is different from a surface crosslinking reaction step. An important feature of the present invention is to avoid substantial surface crosslinking during thermal pressing of the SAP component-plasticizer component mixture. This is accomplished by utilized [sic] a time, temperature, and pressure that is insufficient to accomplish surface crosslinking.

A sufficient amount of the plasticizer component, in its free, unreacted form, therefore, is present in the absorbent sheet material to impart and maintain flexibility in the sheet. When the plasticizer component is substantially consumed in a surface crosslinking reaction during thermal heating, the flexibility and structural integrity of the absorbent sheet material is adversely affected.

Persons skilled in the art are capable of judiciously selecting the thermal pressing temperature, pressure, and time for the particular SAP component and plasticizer component to avoid substantial surface crosslinking. In particular, persons skilled in the art are aware that various compounds useful as plasticizers of a present absorbent sheet also can be used as surface crosslinking agents of an SAP. Persons skilled in the art also are aware of the conditions needed to affect surface crosslinking, and can design thermal pressing conditions to avoid substantial surface crosslinking of the SAP component by the plasticizer component." (page 22, lines 12-31)

The '196 patent discloses the *need* to covalently bond the polycationic polymer to the absorbent particle in order to improve liquid permeability, which is in direct contrast to the present claims wherein covalent binding of the plasticizer component to the SAP component is avoided. The '196 patent therefore clearly leads persons skilled in the art away from the present invention by discouraging a polycationic polymer in its free, unreacted form, as is presently claimed.

The examiner also states that the polycationic polymer is a plasticizing component. This assertion is incorrect.

The '196 patent teaches that the polycationic polymer has multiple functional groups capable of covalently bonding to absorbent particle surfaces (column 4, lines 29-31). The reaction between the $-\text{NH}_2$ groups of the polycationic polymer and $-\text{CO}_2\text{H}$ groups of the absorbent particle is necessary to impart superior liquid permeability by the formation of *rigid* or *hard* particles (column 4, line 48 through column 5, line 6). Polycationic polymers are disclosed at column 5, lines 7-20, including polyethyleneimine.

In contrast, a plasticizing component of the present invention reduces rigidity, stiffness, and brittleness of an absorbent sheet (specification page 17, lines 3-6), and this is accomplished by *avoiding* covalent binding of the plasticizing component to the SAP component, as presently claimed.

The '196 patent further fails to teach or suggest a plasticizing function for the polycationic polymer, but rather teaches a function of rigidity and hardening, i.e., the opposite of plasticizing. The polycationic polymers of the '196 patent should be compared to the plasticizing components specifically recited in present claims 9 and 10, and the differences in structure noted.

The examiner specifically relies upon claim 1 and column 5, lines 30-35 of the '196 patent to support the contention that the '196 patent discloses a plasticizer component. However, this disclosure merely teaches a polycationic polymer and does not remotely teach or suggest a plasticizer, thus applicants question the basis of the examiner's contention. The polycationic polymers of the '196 patent are not included in the present claims or

specification (see specification, page 16, lines 27 through page 19, line 7). Also, the '196 patent teaches a rigid and hardening of the absorbent particles, which is the opposite of plasticizing. Further, after the polycationic polymer covalently bonds to the absorbent particle surface, any arguable plasticizing effect of the polycationic polymer would be lost, as taught in the present specification at page 22, lines 12-31.

The examiner also is directed to Examples 1 and 2 at pages 23 and 24 of the present specification showing that the claimed sheets are *just that*, as opposed discrete particles. In addition, in Example 1, the plasticizing component is propylene glycol and the propylene glycol did not surface crosslink the SAP particle, i.e., no reaction occurred (specification, page 23, lines 13-15). This is in direct contrast to the '196 patent which *requires* a reaction between the polycationic polymer and the absorbent polymer ('196 patent, column 4, lines 46 through column 5, line 6). The '196 patent therefore leads a person skilled in the art away from the claimed invention.

Contrary to the examiner's further contentions regarding to '196 patent, the cited reference discloses an absorbent core, as opposed to a flexible sheet, *and* the '196 patent fails to disclose a plasticizing agent. A present flexible sheet can be free of fibers, is formed as a continuous sheet, has good absorbency properties, is dense, *and* provides a thin absorbent sheet. These features are provided by having a plasticizer component that is *not* covalently bonded to the SAP component, i.e., essentially no surface crosslinking, which is in direct opposition to the teachings of the '196 patent.

The secondary '101 patent fails to overcome the deficiencies of the '196 patent. In supporting the present rejection of the claims, the examiner contends that it would have been obvious to substitute the multicomponent SAP particles of the secondary '101 patent for the SAP particles of the primary '196 patent, and thereby arrive at the presently claimed invention.

The secondary '101 patent is directed to a single particle containing both an acidic resin and a basic resin. As disclosed in the '101 patent, neither the acidic resin nor the basic resin alone performs as an SAP. However, when combined together in the same particle, the resulting multicomponent particle is an excellent SAP. The '101 patent also has

disclosure relating to a mixture of acidic resin particles and basic resin particles, which likewise provides an excellent SAP composition.

A person skilled in the art however would have had *no* reason to substitute a mixed SAP of the '101 patent for the absorbent particles of the '196 patent because *nothing* would be achieved.

More particularly, the '101 patent discloses SAPs containing an acidic water-absorbing resin (e.g., containing a plurality of $-CO_2H$ groups) and a basic water-absorbing resin (e.g., containing a plurality of $-NH_2$ groups). This is the same combination of polymers disclosed in the '196 patent, i.e., a hydrogel forming polymer containing $-CO_2H$ groups and a polycationic polymer containing $-NH_2$ groups. Like, the '196 patent the '101 patent also is directed to discrete particles, as opposed to a flexible sheet.

The '101 patent is totally silent with respect to the preparation of absorbent sheets, but rather discloses the formation of particles having microdomains of an acidic resin and microdomains of a basic resin in the same particle, and also discloses a mixture of acidic resin particles and basic resin particles. No absorbent sheet is disclosed, let alone an absorbent sheet that excludes fibers.

Therefore, a person skilled in the art arguably may substitute particles of the '101 patent for particles of the '196 patent, but neither reference teaches or suggests a plasticizing component and neither teaches or suggests a flexible sheet. Because the combination of references fails to disclose each element of the present claims, a *prima facie* case of obviousness cannot be sustained. Further, the primary '196 patent teaches the formation of covalent bonds, which teaches *away* from the presently claimed invention.

In addition, because neither reference discloses a flexible sheet, the references cannot disclose or suggest a sheet having a density of 0.65 and 0.85 g/cc. The references teach no more than an absorbent core for an absorbent article, but do not teach a coherent, flexible sheet. Thus, another reason exists to defeat a contention of *prima facie* obviousness.

The examiner also *neglected* the term "flexible" recited in the present claims based on an assertion that the claimed sheet is substantially identical in structure and composition to embodiments in the '196 and '101 patents.

The substantial difference in structure and composition between the discrete particles of the cited references (with covalent bonding between the SAP and polycationic polymer) and the sheets as claimed (with no covalent bond between the SAP component and plasticizing component) has been discussed above. The examiner incorrectly states that the references teach a sheet. The cited references clearly are directed to discrete particles, and as such have a structure drastically different from the claimed sheet. The cited references also fail to teach or suggest a plasticizing component, and as such *also* have a composition different from the claimed sheet. The same reasoning applies to the examiner's comments directed to claim 15.

The examiner also is directed to *In re Buszard*, 504 F.3d 1346 (Fed. Cir. 2007), wherein a flexible polycationic is *not* anticipated by a foam that is crushed to make it flexible. The court stated that it is a *not reasonable* claim interpretation to equate "flexible" with "rigid", or to equate a crushed rigid polyurethane foam with a flexible polyurethane. Similarly, in the present case, it is not reasonable to equate rigid particles to a flexible sheet. The examiner cannot simply erase the term "flexible" from the claims.

With respect to the examiner's contention that the '196 patent teaches plasticizers, the excerpt at column 9, lines 16-19 of the '196 patent is directed to solvents used in the reaction between the absorbent polymer and the polycationic polymer. These solvents are *removed* during or after the reaction, and hence are not present to function as a plasticizer ('196 patent, column 9, line 66 through column 10, line 27). Heating at the disclosed temperature evaporates the solvents used to solubilize the polycationic polymer. See '196 patent, claim 21, step (d).

In view of the above, it is submitted that claims 1-10, 13-15, 18-20, 23, 25, and 28 would not have been obvious over a combination of the '196 and '101 patents. In particular, the examiner has failed to establish a *prima facie* case of obviousness because there is no apparent reason for a person skilled in the art to combine the references in a

fashion presently claimed *and* the references, alone or in combination, do not teach or suggest all of the features of the claims. Neither reference discloses or suggests a flexible sheet or a plasticizing component, let alone *both* claimed features. Further, the '196 patent clearly teaches persons skilled in the art *away* from the presently claimed invention. Therefore, for all the reasons set forth above, the present rejection of claims 1-10, 13-15, 18-20, 23, 25, and 28 as being obvious under 35 U.S.C. § 103 over the '196 and '101 patent should be withdrawn.

Claim 12 stands rejected under 35 U.S.C. §103 as being obvious over the '196 patent in view of the '101 patent, and further in view of Brueggemann et al. U.S. Patent No. 6,051,317 ('317). Applicants traverse this rejection.

The patentability of claims 1-10, 13-15, 18-20, 23, 25, and 28 over a combination of the '196 and '101 patents is discussed above. The '317 patent does not overcome the deficiencies of the '196 and '101 patents discussed above. Claim 12 is a preferred embodiment of the present invention. Applicants do not rely solely upon the features of claim 12 for patentability, but rely upon all the features of both claim 12 *and* independent claim 1 from which it depends. Accordingly, it is submitted that claim 12 is patentable over a combination of the '196, '101, and '317 patents for the same reasons claim 1 is patentable over a combination of the '196 and '101 patents.

Further, claim 12 recites that a polyethylenimine is a basic water-absorbing resin, not a plasticizer, and the recited plasticizers are not disclosed in the '196 patent, except as a solvent for the polycationic polymer, which is *removed* from the particles by heating.

Claim 17 stands rejected under 35 U.S.C. §103 as being obvious over a combination of the '196 patent in view of the '101 patent, and further in view of Schmidt et al. U.S. Patent No. 7,195,810 ('810). Claims 21, 22, and 24 stand rejected under 35 U.S.C. §103 as being obvious over a combination of the '196 patent in view of the '101 patent and further in view of Widland et al. U.S. Patent No. 5,728,085 ('085). Applicants traverse these rejections.

The patentability of claims 1-10, 13-15, 18-20, 23, 25, and 28 over a combination of the '196 and '101 patents has been discussed above. The '810 and '085 patents do not overcome the deficiencies of the '196 and '101 patents. Claims 17, 21, 22, and 24 are preferred embodiments of the present invention. Applicants do not rely solely upon the features of claims 17, 21, 22, and 24 for patentability, but rely upon all the features of each of claims 17, 21, 22, and 24 *and* independent claim 1 from which they depend. Accordingly, it is submitted that claims 17, 21, 22, and 24 are patentable over a combination of the '196 and '101 patents and either the '810 or '085 patent for the same reasons claim 1 is patentable over a combination of the '196 and '101 patents.

It is submitted that the claims are in proper form and scope for entry and allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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